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## Integrated Paper Recycling Management System in UKM Campus

Rahmah Elfithri<sup>a,\*</sup>, Tiew Kian Ghee<sup>b</sup>, Noor Ezlin Ahmad Basri<sup>b</sup>, Shahrom Md Zain<sup>b</sup><sup>a</sup> *Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia*<sup>b</sup> *Department of Civil and Structural Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia*

### Abstract

Solid waste always produce negative impacts to the environment, thus effective solutions must be implemented. However, most people are not concerned of the importance of recycling. At the Universiti Kebangsaan Malaysia (UKM) which has already launched the sustainable campus programme in 2007, the initiative to managing the solid waste and conducting the recycling programs were advocated through the Zero Waste Campus Initiative (ZWCI), where the team are committed to do the awareness, practices and enforcement regarding solid waste management in UKM. It would be undesirable if these initiatives to educate the majority of the community of UKM were not put into practice. To solve this problem, a study has been conducted to determine an effective method of recycling management at UKM in providing quality service that encouraged UKM's community to recycle. The effectiveness of recycling programs is influenced by a number of factors such as proper service facilities and good management system. Paper recycling boxes in each office which is one of recycling component that play important role to educate UKM staff and awareness of importance recycling system in waste management campus. This paper discusses the efforts carried out at UKM to create an operational system and implement efficient recycling management by improving the current management system.

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**Keywords:** Recycling; paper; sustainable; campus; Universiti Kebangsaan Malaysia

### 1. Introduction

In new century, human activities are still involving paper materials. For example, paper still part of our daily lives which is from posters and notebooks to cardboard boxes and magazines. Paper recycling is needed in our daily activities with recycling one morning newspaper everyday could save 41,000 trees from being cut down and greatly reduces our carbon footprint (<http://www.greenstudentu.com/encyclopedia/recycling/paper>, 2011). Paper recycling is not a new concept because since 1994 European Community legislation, under the Directive on Packaging and Packaging Waste 94/62/EC (EC, 1994), had started to set targets to increased recycling of paper and cardboard from packaging (Villanueva & Wenzel, 2007).

In year 2005, Malaysia papers comprising up to 7% of the municipal solid waste stream (JPSPN, 2010). In the Universiti Kebangsaan Malaysia (UKM), the study on paper waste which conducted by the ZWCI of UKM is about

\* Corresponding author. Tel.: +6-03-8921-7642; fax: +6-03-8925-5104.

E-mail address: [elfith\\_ukm@yahoo.com](mailto:elfith_ukm@yahoo.com).

17% and paper recycling is an obvious and easy way to reduce waste in the workplace. Hence, paper recycling boxes at offices could be a solution to reduce waste disposal in campus UKM (Kian-Ghee Tiew, 2011).

## 2. Background of Case Study

Universiti Kebangsaan Malaysia (UKM) was officially established on 18 May 1970. The main campus of UKM is located at Bandar Baru Bangi, Selangor and consist of 12 faculties, 12 centres, 14 institutes, and a research bureau. Currently, the estimated population are 30,000 people which included lecturers, employees, and students. Hence, about 8 tonnes per day solid waste is generated by 30,000 populations. Memorandum of Agreement (MoA) was signed on 18 December 2008 at Wisma DRB-Hicom to formalize the collaboration between Alam Flora Sdn Bhd and UKM. This collaboration is established to conduct the Integrated Solid Waste Management in UKM to enable the university to achieve its mission on Zero-Waste campus and to be a role model for other universities in Malaysia.

A study of solid waste composition at UKM reported that 45.3% of the waste is recyclable, 46.5% is compostable and 8.2% is non-recyclable (Kian Ghee Tiew et. al., 2010), demonstrating that approximately 92% of the waste generated at UKM could be reused as beneficial material. Around 17% of paper waste had been goes directly to a landfill for disposal (Figure 1). Hence, the ZWCI through the Sustainable Ecosystem Management Research Group of UKM had been officially launched and produced a total of 500 unit paper recycling boxes in Januari 2010 to be distributed to all faculties, institutes, centres and colleges in UKM.

Thus, the objective of this paper is to assess effectiveness of paper recycling boxes at offices in UKM as part of solid waste management and improvement of paper recycling boxes system.

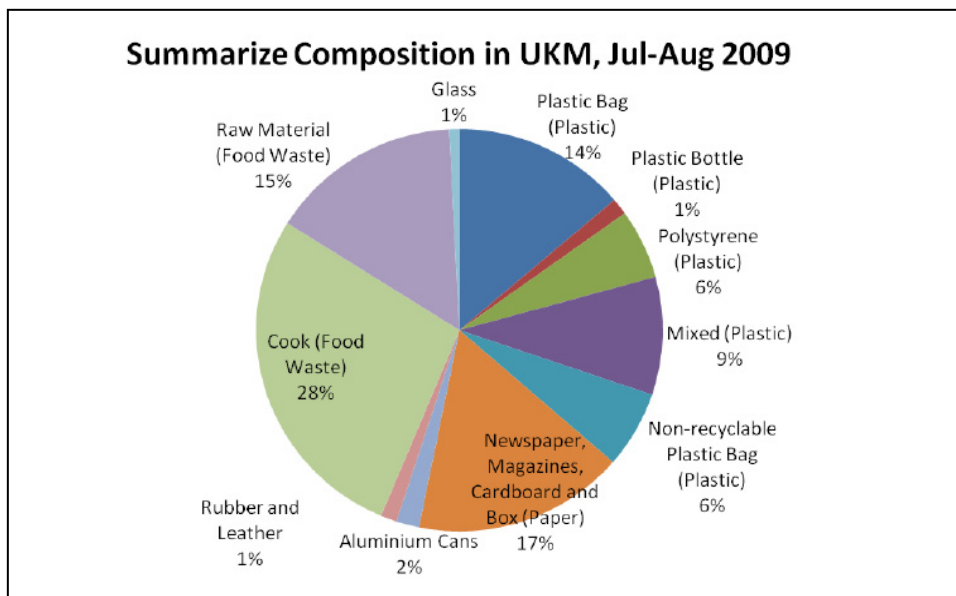


Figure 1. Waste composition UKM year 2009 (Sources: Kian Ghee Tiew et. al., 2010)

## 3. Materials and Methods

In February 2010, total of 301 paper recycling boxes have been distributed to the 64 office locations which is contains 7 faculties, 11 institute, 10 dormitories, 10 centers and 26 others office. One coordinator was appointed for these each location to handle and monitor the paper recycling boxes within their territories, and then they will make a record on total paper recycling generated from their locations.

Paper recycling boxes mostly placed nearby a Photostat machine area at the offices for easy access as shown in Figure 2. Analysis on effectiveness of paper recycling boxes will be based on monthly data collection from Alam Flora Sdn Bhd Company and improvement of paper recycling boxes.



Figure 2. Paper recycling boxes at the office

#### 4. Results and Discussion

Monthly Paper recycling boxes collection shows that the system is adopted by the staff since the rate of paper waste collection is gradually increasing as shown in Figure 3. The highest collection was in December 2010 which was 4,886 kg but in January 2011 total collection dropped to 331 kg this is due to the lack communication between collector and coordinators.

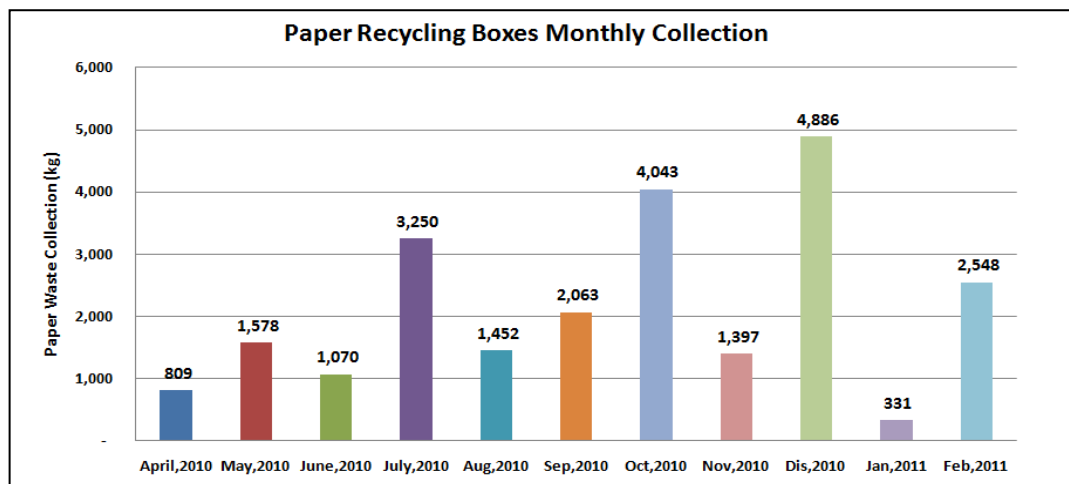


Figure 3. Paper collection rate by Alam Flora Sdn Bhd in April 2010-February 2011

Table 1 shows that the percentage of participants in paper recycling collection is still low which is not achieving 50% yet. The problems occur by lack of responsible of coordinator and ignore the recycling system. Hence, UKM management should starting became of enforce a green rule and regulation for the staff to increase recycling rate while at the same time reduce waste disposal.

Table 1. Location of participant paper recycling collection

	2010								2011		
	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Participant	9	16	4	10	7	9	13	13	20	4	19
Not Participant	56	49	61	55	58	56	52	52	45	61	46
Total	65	65	65	65	65	65	65	65	65	65	65
Percentage of Participant	13.8%	24.6%	6.2%	15.4%	10.8%	13.8%	20.0%	20.0%	30.8%	6.2%	29.2%

Table 2 shown top 14 paper recycling collection which is Tun Seri Lanang Library, Industry's Liaison Office, Faculty of Economic and Business, Faculty of Engineering and Built Environment, Division of Human Resources Division, Faculty of Islamic Studies, Bursar's Office, Centre for Information Technology, Pendeta Zaba College, Faculty of Education, Faculty of Law, Institute of Occidental Studies, Centre for Corporate Planning and Communication, and Keris Mas College. The result shows that, some of offices are very participant for this paper recycling system.

Table 2. Top 14 paper recycling boxes collection locations

No	Paper Recycling Boxes Location	2010								2011		Total	
		April	May	June	July	Aug	Sep	Oct	Nov	Dis	Jan		Feb
1	Perpustakaan Tun Seri Lanang			524		477	1,009		583	1,200		696	4,489
2	Pejabat Hubungan Industri									1,981			1,981
3	Fakulti Ekonomi						326	1,209	225	134			1,894
4	Fakulti Kejuruteraan		87	387	403			372	84		139	18	1,490
5	Bhgn Sumber Manusia				1,316								1,316
6	Fakulti Pengajian Islam	61	288		768				31			87	1,235
7	Jab. Bendahari		352			337				293			982
8	Pusat Teknologi Maklumat	165	94		204	14	221	56	42	68			864
9	Kolej Pendeta Zaaba	63	125					645					833
10	Fakulti Pendidikan	185	43		164		61		38	25		179	695
11	Fakulti Undang-Undang	148			261				143		102		654
12	Inst. Kajian Oksidental (Ikon)							578					578
13	Pusat Perancangan & Komunikasi Korporat							375				83	458
14	Kolej Keris Mas			63		333		35		12			443

Rate of participant of paper recycling is still low due to improper management and the coordinators lack of awareness about important of paper recycling boxes at office. Figure 4 shows the proper management of paper recycling boxes flow at the office.

To raise awareness of the importance office paper recycling system in UKM offices, the “Awareness and Recycling Management” workshop had been organized by Ecosystem Management Research Group and ZWCI at 3 Mac 2011 on Centre for Research and Instrumentation hall, UKM. Figure 5 shows participants in questioning recycling system in UKM. Besides that, the workshop also debate with office paper recycling coordinators how to increase and improves the paper recycling system in campus. The positive impacts has shown by the coordinators because of 69 participants were attending the workshops and from the session dialogue, shows that the coordinators are passionate to improve and increase the rate of recycling in offices UKM. Hence, paper recycling system in UKM in the right track and moving towards zero waste campus in the future.

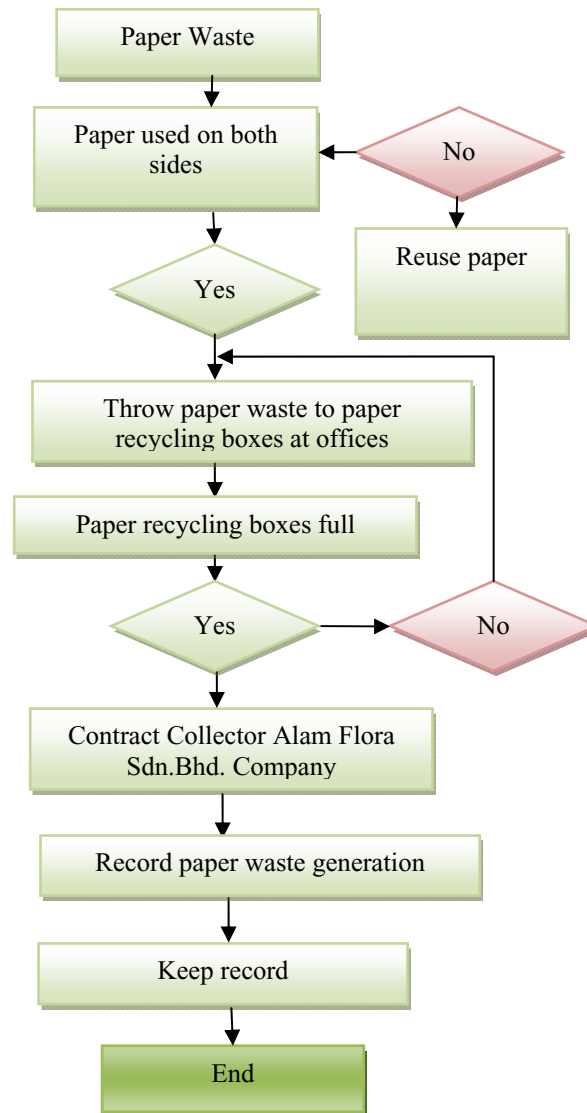


Figure 4. Flow chart of paper recycling boxes in UKM



Figure 5. Awareness and Recycling Management” workshop

## 5. Conclusion

The total recycling rates recorded from April 2010 to February 2011 was 23,427 kg showing that the recycling level was low at UKM. And the results shows that the coordinators ignorant about paper recycling system which beneficial to environment. Hence, allocating paper recycling boxes in each office facilities at strategic locations and the upgrading systems of delivering information regarding the importance of recycling is expected that our target recycling rate of 20% can be exceeded in 2011. The effectiveness of recycling management at UKM along with involvement and support from the UKM community will have a beneficial impact on the UKM community's well being. The primary goal is to reach the target of zero waste so that the concept of a sustainable campus becomes reality. This initiative will lead into Integrated Paper Recycling management System in the Campus to be better managed and well organised in the future.

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